STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
July 14, 2005	G2-30268		

NAME
Port of Allyn

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
P.O. Box 1	Allyn	Washington	98524

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
One existing well (Well No. 1) and one proposed well (Well No. 2)

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	555*	300*

* Both quantities are additive to G2-26628C.

QUANTITY, TYPE OF USE, PERIOD OF USE

Municipal, as needed year round.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL

Approximately 1,650 feet south and 4,000 feet east of the northwest corner of Section 20 (existing Well No. 1); and
Approximately 600 feet south and 2,700 feet east of the northwest corner of Section 20 (proposed Well No. 2).

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE1/4, NE1/4 NW1/4, NE1/4	20	22	1 W	14	Mason

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The place of use of this water right is the service area of the Port of Allyn as described in the Water System Plan approved by the Washington State Department of Health on September 4, 2003. Update of the Water System Plan to expand the service area to the entire Allyn UGA is pending.

DESCRIPTION OF PROPOSED WORKS

The Port of Allyn water system currently consists of one well (Well No. 1), approximately 4,600 linear feet of 8-inch water main, a pump house, seven fire hydrants, and a 144,000 gallon storage tank capable of serving 200 connections. Originally completed with an open bottom, recent reconstruction of Well No. 1 included bailing the accumulated sand from the casing, perforating the original casing from 238 to 242 feet below ground surface (bgs), and installing an 11-foot well screen assembly with a five foot 40-slot prepacked screen from 240 to 245 feet bgs. The well is currently equipped with a 10 horsepower (hp) pump capable of producing 65 gallons per minute (gpm). Siting and construction of Well No. 2 is pending.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Complete	March 2020	March 2030

REPORT

BACKGROUND

On July 14, 2005, Bonnie Knight, Executive Director of the Port of Allyn, filed an Application for a Water Right (G2-30268) with the Washington State Department of Ecology (Ecology) for a permit to appropriate public groundwater. The applicant requested authorization for an instantaneous withdrawal rate (Qi) of 555 gallons per minute (gpm) and a total annual withdrawal volume (Qa) of 300 acre-feet per year (afy). Planned use of the appropriation is for general municipal supply.

The proposed point(s) of withdrawal are located in the Town of Allyn. The place of use includes the town and the surrounding Allyn UGA, within the state's Water Resource Inventory Area (WRIA) 14, in Mason County. Notice of the application was published in the *Kitsap Sun* of Bremerton, Washington, on January 27 and February 3, 2010. No protests were received by Ecology.

The subject application is categorically exempt under SEPA (WAC 197-11-305 and WAC 197-11-800(4)) because the instantaneous quantity is less than the 2,250 gpm threshold.

Based on the provisions of RCW 43.21A.690 and RCW 90.03.265, this application has been processed by Aspect Consulting, LLC (Aspect Consulting) under Ecology Cost-Reimbursement Work Assignment No. ASP005 (Master Contract No. C1000185).

INVESTIGATION

In consideration of this application, Aspect Consulting reviewed available documents pertaining to the application's site conditions, projected water demand, and the potential effect on existing water right holders and established minimum instream flows. This included information submitted by the applicant, including well construction and testing reports, leakage and stream depletion analysis, and proposed mitigation strategies, along with pertinent Ecology records, including well logs and water rights records. The review also included reports from multiple investigations characterizing the hydrogeology and water quality of the WRIA, as well as the documents resulting from the watershed planning process.

A site visit was performed on May 15, 2007 by Tyson Carlson of Aspect Consulting. The site visit included inspection of the existing point of withdrawal and place of use and an interview with the applicant. Since the site visit, multiple meetings have been held to discuss predicted impacts to instream flows and the proposed mitigation plan. In addition to the consultation conducted by Ecology, several meetings included John Konovsky of the Squaxin Island Tribe to discuss the Tribe's concerns relating to the applicant's request and proposed mitigation strategies.

Using this information, Aspect Consulting evaluated water availability and potential for impairment of existing water rights and instream flows. Each of the four requirements specified in RCW 90.03.290 were individually examined, including the effectiveness of the proposed mitigation plan, and are presented below.

Project Description

The Application for a Water Right for the Port of Allyn (Port) seeks authorization to withdraw groundwater from two wells. Well No. 1 supports the Port's existing water system, currently certificated for 65 gpm (Qi) and 14 afy (Qa) under G2-26628C. The existing water system serves 12 customers – 6 full time residents and 6 commercial connections. The system also provides water to a public park with five restrooms.

Since submitting the subject application, the Port has begun improvements to the water system, including construction of a 144,000 gallon storage tank and 4,600 linear feet of 8-inch water main, including seven fire hydrants in the commercial corridor and neighboring residential areas. The additional infrastructure allows the Port to immediately service up to 200 connections. As the community grows and demand increases, Well No. 2 will be constructed to serve the long-term needs of the water system.

The current water system plan was approved by the Department of Health in September 2003 (The Kirkbride Group). The Port is planning a revision of the water system plan pending outcome of the subject water right application. The updated water system plan will detail expansion of the existing water system to service the entire Allyn UGA.

Site Description

The proposed points of withdrawal are located near the commercial core of the Town of Allyn. Well No. 1 is located immediately behind the Port of Allyn's office, approximately 50 feet from the shoreline of North Bay – one of the southern terminuses of Puget Sound, in the southeast quarter of the northeast quarter of Section 20 in Township 22 North, Range 1 West Willamette Meridian (WM). Siting of the second well (Well No. 2) has not been finalized, but will likely be near the Port's storage tank, in the northwest quarter of the northeast quarter of Section 20 in Township 22 North, Range 1 West WM.

No original well construction report is available, but inspection indicates that Well No. 1 was advanced to about 242 feet below ground surface (bgs). In addition, video logging illustrated the 6-inch casing was completed with an open bottom and unable to produce more than 30 gpm without excessive amounts of sand. Well No. 1 exhibits flowing artesian conditions, with a static shut-in pressure of 12 pounds per square inch (psi), or approximately 30 feet above ground surface.

Robinson, Noble & Saltbush (RNS 2008a) recently reconstructed Well No. 1, with the goal of producing a minimum of 65 gpm sand free. Reconstruction included bailing the accumulated sand from the casing, perforating the original casing from 238 to 242 feet bgs, and installing an 11-foot well screen assembly with a five foot 40-slot prepacked screen from 240 to 245 feet bgs. In addition, two feet of 6-inch well casing was welded to the top of casing to provide a more sanitary wellhead, under an approved variance from Ecology.

Construction details of Well No. 2 are pending, but assumed to include an 8- to 12-inch casing completed to a similar elevation below ground surface (i.e. same water bearing unit). Future well completion details will be based on observed conditions during drilling. It is recognized that the Port is unlikely to get the entire requested Qi (555 gpm) from one well. Therefore an additional new well, or a replacement to Well No. 1, will be required prior to certification.

The place of use includes the Town of Allyn and the surrounding Allyn UGA. The Allyn UGA extends from the shoreline of North Bay (east), to just beyond the Burlington Northern Railroad corridor (west), to Sherwood Creek (south), and beyond the adjacent development of Lakeland Village (north). The Allyn UGA was established under the conditions of the State of Washington Growth Management Act. The Allyn UGA Comprehensive Plan establishes a vision, goals, and policies for the future of the community. The plan includes an element addressing infrastructure and services needed to support the proposed land use growth and development, including necessary capital improvements (i.e. public water systems). The Port owns the only public water system in the UGA. Several private water systems serve portions of the UGA, including the Lakeland View Water Company and Washington Water Service.

The Port of Allyn has been actively pursuing development of a municipal system to service the entire UGA since 1998. Operation and ownership of the water system will be transitioned to the city following incorporation.

Hydrogeologic/Hydrologic Assessment

The hydrogeology of WRIA 14 is typical of the Puget Sound lowlands. Although bedrock outcrops in an area referred to as the Black Hills, the majority of the watershed is dominated by sequential layers of glacial and non-glacial material deposited over an extended period of time. Repeated glacial advances and recessions alternately deposited and then compressed massive amounts of sediment over the bedrock. During glacial retreat or interglacial periods, streams eroded and re-deposited the unconsolidated materials. The shallow soils and geology surrounding the Port's proposed place of use are characteristic of the latest glaciation when the Vashon glacier advanced into the Puget Sound region, while deeper sediments are characteristics of older Pre Vashon glacial and interglacial periods.

The Town of Allyn is located at the base of the coastal bluffs along the shoreline of North Bay, a shallow saltwater embayment of Case Inlet – one of the southern terminuses of Puget Sound. From the shoreline, the bluff rises to approximately 270 feet elevation above mean sea level (msl) before descending into the adjacent Sherwood Creek drainage.

Sediment outcropping along the bluffs includes Vashon Till (Qvt), comprised of compacted and often cemented mixture of gravel in a silty sand matrix. The cemented low permeability sediment regionally functions as an effective aquitard and often gives rise to confined aquifer conditions in the underlying Vashon Advance Outwash (Qva).

The Vashon Advance Outwash was deposited as the Vashon glacier moved south into the Puget Sound lowlands. Advance Outwash typically consists of mixed sand and gravel, with minor amounts of silt. An estimated 25 percent of the water supply wells in the region are completed in this unit (PGG 2005).

Below is the non-glacial Olympia Beds, composed predominantly of fine sand and silty sand with local gravel and scattered organics. Low permeability units within the Olympia Beds are generally considered to be a non-water bearing aquitard throughout the region (Northwest Land & Water 2005).

Deeper regional units consist of a thick sequence of glacial and non-glacial deposits. The upper portion consisting of saturated sand and gravels have been termed the Sea Level Aquifer (Northwest Land & Water 2005). The aquifer is typically encountered 50 to 200 feet below ground surface (RNS 2008b). Numerous wells of the Lakeland Village Water System are completed in this aquifer, with heads of approximately 40 feet above msl. Even near the shoreline, confined heads are above ground surface, indicating that discharge from the Sea Level Aquifer is toward North Bay via leakage through the overlying Olympia Beds, or directly to Case Inlet. Approximately 75 percent of the area's water supply wells are completed in this unit – including many of the Lakeland View Water Company's water supply wells (PGG 2005) and the Port's existing Well No. 1.

Following the recent reconstruction of Well No. 1, a pumping test was conducted at an average rate of 65 gpm for 21.5 hours, resulting in 43 feet of drawdown (specific capacity of 1.5 gpm/ft). An average tidal fluctuation of two feet was observed in the well during background monitoring (compared to a 10 to 12 foot tide). Robinson, Noble & Saltbush (2008a) calculated an average aquifer transmissivity equal to 8,900 gpd/ft. For comparison, testing of Lakeland Village Well 6 yielded an aquifer transmissivity of 9,300 gpd/ft (PGG 2005). No interference drawdown effects from distant pumping wells were observed in background groundwater level monitoring of Well No. 1.

Below the Sea Level Aquifer are predominantly undifferentiated Quaternary deposits. Although reference has been made to a "Deep Aquifer" in the undifferentiated deposits (PGG 2005), little is known about its regional occurrence or water bearing properties.

Minimum Instream Flows

A state instream resources protection program with specified minimum instream flows and closures is outlined as Washington Administrative Code (WAC) Chapter 173-514. With a priority date of January 23, 1984, the program effectively limits, and in some cases prohibits, the further issuance of consumptive water rights that could affect specified instream flows in WRIA 14.

The nearest closure to the Port's proposed point(s) of withdrawal is Sherwood Creek which originates at Mason Lake and drains northeast to North Bay. From Mason Lake to the mean annual high tide mark in Case Inlet, Sherwood Creek has specified minimum instream flow for all months of the year, and is seasonally closed to further appropriation from September 16 to November 15.

The Washington State Department of Fish and Wildlife (WDFW) has identified Sherwood Creek as a fish bearing stream for several salmonid species, including ESA listed Chinook.

Predicted Impacts to Sherwood Creek

Well No. 1 is located outside the Sherwood Creek basin. The majority of water withdrawn from this well also originates from outside of the basin (or from storage from within the Sea Level aquifer). However, drawdown effects from the pumping of groundwater will propagate radially, decreasing with distance from the point of withdrawal. To the east and south, drawdown effects will be attenuated by the hydraulic boundary represented by Case Inlet; however, a small portion will extend into the Sherwood Creek basin to the west. Although the Sea Level Aquifer may not be in direct geologic contact with Sherwood Creek, drawdown effects from inside the delineated

Sherwood Creek basin may induce increased vertical leakage from the overlying Advanced Outwash (Qva) aquifer which, in turn, may reduce its contribution to creek baseflow.

The impacts to Sherwood Creek were first estimated by Robinson & Noble, Saltbush (2008b) via an analytical analysis based on Darcy's Law. The analysis indicate that during periods of short-term peak demand, pumping at the requested Qi (555 gpm) could induce increased leakage resulting in a streamflow depletion of up to 9 gpm. Additional analysis indicated that under average annual conditions (300 afy is equal to an average volumetric flowrate of 186 gpm), streamflow could be depleted by approximately 5 gpm.

The impact analysis indicates that a maximum of approximately 2% of the water withdrawn from the well(s) is predicted to originate from leakage within the Sherwood Creek basin during peak use. During average annual use, approximately 1% would potentially originate from Sherwood Creek.

Port of Allyn's Proposed Mitigation Plan

To address the potential impacts to instream flows, a mitigation plan was prepared and submitted to Ecology for review (RNS 2009). The proposed mitigation plan utilizes the benefit of return flow from discharge of reclaimed water at the North Bay-Case Inlet Water Reclamation Facility, which serves the entire Allyn UGA, including the unincorporated Town of Allyn. All development, per Mason County Code Title 17.03.030 and 031, within the Allyn UGA must utilize the sanitary sewer.

A description of the reclamation facility and the proposed mitigation plan is provided below. The calculations were previously presented to Ecology in a Summary of Proposed Mitigation (Aspect 2009).

North Bay-Case Inlet Water Reclamation Facility

The reclamation facility is located approximately two miles southwest of the Town of Allyn, on the upper flank of the Sherwood Creek drainage basin, at approximately 320 feet elevation. The facility is located adjacent to an upper tributary of Sherwood Creek. The tributary originates as two forked channels flowing south, becoming incised as they drop in elevation, converge, and curve toward the northeast, merging with Anderson Creek. The creek then travels a short distance to the confluence with Sherwood Creek, just below Mill Pond at the base of the valley. Downstream of the Sherwood Creek confluence, the creek flows approximately 3,000 feet until it discharges to North Bay, just south of the Town of Allyn.

Hydrogeologic Conditions Surrounding The Reclamation Facility

Hong West & Associates (1997) describes the subsurface conditions surrounding the facility. The near-surface geology is typical Vashon glacial sequence – pockets of Recessional Outwash (Qvr) blanket the surface on top of a regionally extensive layer of Vashon Till (Qvt). Where Recessional Outwash is absent, the till is heavily weathered and encountered just below a layer of thin top soil. Based on facility borings, the till is reported to be 10 to 20 feet thick. Below the till is a thick sequence of Advanced Outwash (Qva), extending to more than 115 feet below ground surface. Outcroppings of the Qva aquifer are mapped at ground surface along the axis of the incised Sherwood Creek valley and along the lower reaches of the unnamed tributary and Anderson Creek.

Groundwater is first encountered perched on the low permeable glacial till. The glacial till dips to the east, where shallow groundwater flows over the till surface into the Sherwood Creek basin. Along the incised stream channel, the perched water emanates as springs, and discharges directly to surface water. Evidence of this has been noted in numerous springs and seeps along the hillside directly downgradient of the facility.

Groundwater flow surrounding the reclamation facility within the semi-confined Qva aquifer is reported to flow east-southeast, directly toward Sherwood Creek. Based on the collective geologic evidence, it is implied that the Qva aquifer discharges directly to the Sherwood Creek (and its lower tributaries).

Proposed Point(s) of Withdrawal Radius of Influence

Based on governing Theis assumptions (Theis 1935) and methods developed by Cooper and Jacob (1946), hydraulic parameters were calculated from data presented in PGG (2005). The calculation was based on the distance-drawdown relationship observed in the Well 6 pumping test, where no drawdown was observed in Well 2 (3,000 feet away) after 24 hours of pumping at 400 gpm, resulting in a calculated transmissivity of 42,000 gpd/ft and a storativity of 0.0014 (-).

Using these parameters, no discernable (greater than 0.1 foot) drawdown is predicted to occur further than a 2,900 foot radius from the existing point of withdrawal after 24 hours of continuous pumping at 555 gpm – nearly three times the proposed pumping schedule. The calculation does not include leakage from the overlying aquifer, which would quickly attenuate the small (less than 0.1) far-well numerical drawdown effects. For comparison, the average daily tidal fluctuation observed in Well No. 1 is approximately 2 feet, while the daily tidal fluctuation in Lakeland Village Well 6 is 1.6 feet.

The radial distance from the Port's Well No. 1 to the confluence of Anderson and Sherwood Creeks is approximately 6,300 feet. Similarly, the proposed distance from the confluence to the proposed location of Well No. 2 is approximately 6,400 feet; therefore, all potentially impacted reaches of Sherwood Creek are downstream of the confluence below Mill Pond. With proper spacing and design, the cumulative drawdown effects from the existing well and a future point of withdrawal (Well No. 2) will be less; therefore, the analysis presented above is considered conservative.

Discharge of Reclaimed Water

Following treatment, the facility has two methods for discharging of reclaimed water – irrigation of conifers and infiltration. Irrigation typically occurs during the summer (March through October), while infiltration primarily occurs during the winter (November through April). Some overlap occurs in the early spring (March and April).

In July 2008 to June 2009, the facility processed over 54 million gallons of reclaimed water. Approximately 31 million gallons was irrigated, while 23 million gallons was infiltrated. These quantities reduce to a continuous average volumetric flow rate of 89 gpm (RNS 2009).

Robinson, Noble & Saltbush (2009) assumed that 70 percent of the water withdrawn under the subject application will be sent to the facility as wastewater (USGS 1993). On average, 30 percent of the appropriation will be consumptive. This implies that with full use of the proposed quantities (300 afy; or 186 gpm continuously), approximately 130 gpm of wastewater will be conveyed to the facility for treatment and discharge.

Reclaimed Water Infiltration

Water is infiltrated into the subsurface by use of a large pond located on site. The pond has an approximate area of 141,000 square feet, with a maximum stage height of 12 feet. Water is typically infiltrated during the winter. The ponds are allowed to dry during the summer

for periodic maintenance. An overflow discharge point conveys water out of the pond when stage exceeds 12 feet. At a stage of 9 feet, the pond holds approximately 9.5 million gallons (RNS 2009).

Reclaimed Water Irrigation

During the drier months (March through October), reclaimed water is applied to approximately 18 acres of conifers. The grove of trees is located on the adjacent parcel of Department of Natural Resources (DNR) land. The water is applied by undertree impact sprinklers on a 3-foot riser connected to fixed ground lines. Each sprinkler is capable of approximately 6 gpm. Irrigation is rotated between three zones of 6 acres.

No more than 6-inches of equivalent water (irrigation plus rain) is applied in any one week period. Irrigation continues into the fall season until the storage capacity of the surficial soils is exceeded and seepage is observed in a downgradient culvert.

Mitigation Plan

The concept behind the proposed mitigation plan is that the majority of water withdrawn from the well is from outside the Sherwood Creek Basin, but, all reclaimed water will be discharged inside the Sherwood Creek basin, for a net positive gain.

Mitigation credit for offsetting the predicted impacts will only occur with water withdrawn under the subject application. No mitigation credit is given for reclaimed water already discharged at the reclamation facility. Mitigation will occur by both means utilized by the facility; however, the effectiveness will differ depending on the method used and time of year as described below.

Infiltration Return Flow

Infiltration primarily occurs during the winter where precipitation is high and evaporation is negligible. Therefore, it was determined that on an average annual volumetric basis, 100 percent of the treated effluent which is placed in the infiltration pond will infiltrate into the subsurface and likely benefit Sherwood Creek instream flows. This equates to an average of 130 gpm under full use of the quantities requested.

This was concluded based on the following:

1) Potential evaporation from the surface of the infiltration pond is already occurring, whether the Port withdraws water under the subject application or not. It was assumed that the change in surface area is negligible; therefore, no additional evaporation is expected to occur from the pond surface with the addition of the Port's return flow; and

2) The Washington Irrigation Guide (WIG; USDA 1997) presents climate data for the entire State. The nearest WIG station to Allyn is Shelton, Washington. The WIG presents climate data on a monthly interval. Climate data includes, mean temperature, total precipitation, reference crop evapotranspiration (ET), and effective precipitation. The WIG also presents crop irrigation requirements (CIR) and consumptive use for several local crops.

Evaporation from an open body of water is defined as the difference in total precipitation and the reference crop ET following adjustment for transpiration. The adjustment occurs by applying the applicable coefficient for the size and depth of the water body, typically between 0.6 and 0.7 (Allen and Robison 2009). A negative number indicates water is lost from the water body, where a positive number implies no net evaporation is occurring and water is gained by incidental precipitation.

This calculation indicates that from September 2008 to April 2009, no water was lost from the pond due to evaporation. In fact, over 4 million gallons (12.3 afy) was gained from rainfall. This gain in volume is not considered mitigation.

Irrigation Return Flow

Irrigation of 18 acres of conifers located on the adjacent DNR land is the preferred method of reclaimed water discharge during the late spring, summer, and early fall months, typically March through October. The amount of return flow available for mitigation is defined as the quantity of water applied to the conifers, less the crop irrigation requirement (CIR) and evaporative loss (%Evap). In this determination, the following was assumed:

1) The WIG presents CIR data for a reference crop (typically alfalfa) at the Shelton station. Although no specific CIR data is presented for conifers, the reference crop CIR can be adjusted to represent conifer by applying an empirical coefficient as defined by the Food and Agriculture Organization of the United Nations (FAO 1998). Coincidently, the coefficient for conifer trees is 1.0 for the entire growing season; therefore, the CIR for conifers is equal to the reference crop defined in the WIG; and

2) Ecology's guidance GUID-1210 (Ecology 2005) defines %Evap as the evaporative losses that occur when transporting water to the crop's root zone, including spray evaporative loss, canopy loss, and wind drift. These evaporative losses represent consumptive water use in addition to the CIR. GUID-1210 assigns a %Evap equal to 10% value for solid set undertree and impact sprinklers.

Using these assumptions, the calculated CIR for conifers is currently exceeded for all months of the year. Water applied as irrigation (minus %Evap) in excess of the CIR is considered return flow. Water applied as irrigation (minus %Evap) that would be withdrawn under the subject application and applied in excess of the CIR is considered mitigation. Therefore, under full use of the appropriation, 117 gpm can be credited toward mitigation from irrigation.

Net Mitigation Quantities

Based on the collective rationale presented above, the analyses indicate that under both average and peak pumping conditions, impacts to Sherwood Creek are fully mitigated. An average net mitigation (total return flow – predicted impacts) amount of 108 to 125 gpm is predicted to directly benefit instream flows in Sherwood Creek under full use of the subject appropriation.

Water Quality

Water quality is a primary concern in WRIA 14, particularly due to its potential negative effects on shellfish habitat. The most widespread pollutant in the WRIA is fecal coliform, associated with septic systems. Fecal coliform – used as an indicator organism of other pathogens – typically originates from sewage or poorly functioning septic systems. Although fecal coliform does not directly affect fish or shellfish health, shellfish do accumulate the organisms making them unfit for human consumption. Currently, there are two 303(d) listings of impaired water quality in the Case Inlet subbasin, including North Bay for dissolved oxygen and fecal coliform.

Likewise, several surface water bodies in WRIA 14 have been given a 303(d) listing for dissolved oxygen, fecal coliform, pH, and temperature. Sherwood Creek is listed for dissolved oxygen and temperature and is classified as a Category 2 water of concern.

Due to the relative rural setting of much of WRIA 14, groundwater quality data is limited. The primary source of existing data is from the City of Shelton's ongoing water quality testing program for its municipal supply, which indicates that all primary maximum contaminant

levels (MCLs) are being met. In addition, no volatile organic compounds (VOCs) have been detected, and radionuclides are below the applicable trigger levels.

Specifically to the Port of Allyn, groundwater quality data collected at Well No. 1 indicate no exceedances of primary or secondary MCLs. Historic water quality testing of Well No. 1 has not shown any indication of saltwater intrusion (RNS 2008a). Additional data collected from Lakeland Village and neighboring nearshore wells indicate chloride concentrations of 2 mg/L or less (PGG 2005).

Projected Water Demand

The water demand specified in the application is based on estimated growth projections in the Allyn UGA. The pending update to the water system plan will include detailed water demand forecasting for the expansion of the Port of Allyn water system.

APPLICATION EVALUATION

This Report of Examination (ROE) evaluates the application based on the conceptual model presented above. To approve the application, Ecology must issue written findings of fact and determine that each of the following four requirements of RCW 90.03.290 has been satisfied:

(1) The proposed appropriation would be put to a beneficial use;
(2) Water is available for appropriation;
(3) The proposed appropriation would not impair existing water rights; and
(4) The proposed appropriation would not be detrimental to the public welfare.

This ROE addresses these subjects in the above referenced order. Fulfillment of the four requirements determines the decision of Ecology.

Source of Water Proposed for Appropriation

The applicant seeks to withdraw water from two wells located in the southeast quarter of the northeast quarter of Section 20 (Well No. 1) and the northwest quarter of the northeast quarter of Section 20 (Well No. 2) in Township 22 North, Range 1 West Willamette Meridian (WM). The proposed points of withdrawal are located near the commercial core of the Town of Allyn, adjacent to the shoreline of North Bay (Puget Sound). The application requests an appropriation from the Sea Level Aquifer.

Drawdown effects from the pumping of groundwater will propagate radially, decreasing with distance, from the point(s) of withdrawal. However, a small portion will extend into the delineated basin of Sherwood Creek to the west. Assuming aquifer hydraulic parameters reported by PGG (2005) and the quantities of withdrawal requested on the application, pumping from a location anywhere within the proposed quarter section is estimated to result in drawdown extending to the Sherwood Creek drainage.

Although the Sea Level Aquifer may not be in direct geologic contact with Sherwood Creek, drawdown effects from inside the delineated Sherwood Creek basin may induce increased vertical leakage from shallower aquifers which, in turn, may reduce baseflow contribution to the creek. Consequently, the Port's application is considered to be in hydraulic continuity and competing for water within Sherwood Creek which is seasonally closed to further appropriation under Chapter 173-514 WAC.

Beneficial Use

In accordance with RCW 90.54.020(1), the proposed appropriation for municipal use represents a beneficial use of water.

The existing point of withdrawal is supported by the necessary infrastructure to immediately deliver water to approximately 200 connections, including fire flow to both the commercial corridor and neighboring residential areas. Detailed planning on how to deliver water to the entire Allyn UGA is pending and will be presented in the update to Port of Allyn's water system plan. The water will be used at rates consistent with established municipal demand in Western Washington, including all standards required in the Department of Health's Water Use Efficiency Program.

Availability

The proposed point(s) of withdrawal is located outside the regulated Sherwood Creek basin and a small percentage of water withdrawn from the well would otherwise support baseflow to Sherwood Creek. However, all of the flow (minus consumptive uses) from the Port's water system will be conveyed to inside the Sherwood Creek basin for treatment and discharge. Therefore, there is a net positive gain in the quantity of water within basin and the impacts to Sherwood Creek are fully mitigated.

Based on our review of the available documentation and the proposed mitigation plan (RNS 2009), we have determined the following:

- The proposed point(s) of withdrawal is located outside the Sherwood Creek basin. Only a small percentage of water withdrawn from the well(s) would be induced leakage that may otherwise support baseflow to Sherwood Creek;
- All wastewater from the Port's customers within the Allyn UGA will go to the North Bay-Case Inlet Water Reclamation Facility. The facility is located inside the Sherwood Creek Basin;
- Discharge of reclaimed water will have a high degree of efficacy in returning to the subsurface – directly through infiltration or via irrigation of conifers;
- A direct hydraulic connection is present, either as surface water or groundwater, between the facility and all impacted reaches of Sherwood Creek; and
- There is a significant net hydrologic benefit to all potentially impacted reaches of Sherwood Creek under the proposed mitigation plan.

A mitigation agreement between the Port of Allyn and Mason County Utilities & Waste Management was signed on December 22, 2009. The agreement specified the County would permanently allocate and discharge 2.7 acre-feet per month (approximately 20 gpm) of reclaimed water as mitigation on behalf of the Port of Allyn. The discharge will occur either as direct infiltration or irrigation of conifers.

Based on this information, we conclude that the proposed mitigation plan is effective and the quantity of water requested for use in this application is available for appropriation.

Saltwater Intrusion

A common concern along the Puget Sound coastline is intrusion of saltwater induced by pumping of nearshore wells. Saltwater intrusion occurs when head near the submarine outcropping of an aquifer is sufficiently reduced so that it can no longer counter the opposing head of denser saline water; thus, allowing saline water to laterally migrate into the aquifer. Saltwater may also intrude into the aquifer vertically, as leakage from shallow saline water bodies, such as North Bay.

PGG (2005) and Robinson, Noble & Saltbush (2008b) both documented the shallow nature of North Bay, with a bottom elevation of approximately -20 feet msl. Based on bathymetry data, Robinson, Noble & Saltbush (2008b) estimated that the Sea Level Aquifer directly outcrops to Case Inlet, approximately 12,700 feet to the southeast of Well No. 1. Considering the distance to the submarine outcrop is much greater than the radius of influence reported above (2,900 feet), we conclude that the risk of lateral migration of salt water into the Sea Level Aquifer is low.

We also conclude that the risk of vertical leakage of saltwater is low. Nearby well logs indicate the top of the highly confined water bearing Sea Level Aquifer near Well No. 1 is at least 170 feet bgs, while Well No. 1 is completed from 238 to 245 feet bgs. The saline water of North Bay is isolated from the Sea Level Aquifer by at least 50 feet of the non-glacial Olympia Beds (aquitard) and is largely dewatered during low tides. Near the shoreline, static artesian head pressure in the Sea Level Aquifer is in excess of 30 feet above ground surface. During typical operation of Well No. 1, drawdown in the well rarely drops below ground surface, except during extended pumping cycles and much of this drawdown is likely the result of inefficiencies inherent to well redesign. In our experience, efficiencies in similar constructed wells are rarely above 25 percent, implying that more than 75 percent of the observed drawdown in the well is related to well losses and is not representative of surrounding groundwater elevations. Therefore, even during extended Well No. 1 pumping schedules, groundwater elevations in the Sea Level Aquifer will likely remain above the ground surface elevation and will not induce vertical leakage of saltwater.

Similarly, assuming a location of Well No. 2 near the existing storage tank, drawdown at the North Bay shoreline after 365 days of continuous pumping at 186 gpm (300 afy) is calculated to be about 15 feet. This is a most conservative estimate, assuming no leakage from the overlying aquifer and that the entire volume is withdrawn from a single location. Even with additive drawdown effects from pumping Well No. 1, groundwater elevation at the shoreline of North Bay is expected to be above ground surface and not induce vertical (or horizontal) saltwater intrusion. It is recognized that the requested appropriation will likely be divided between multiple wells, including a future replacement to Well No. 1 or an additional point of withdrawal near the storage tank, thus further reducing the impacts.

Although the likelihood of saltwater intrusion is low, the well(s) are considered a risk due to the close proximity of the shoreline and the water right permit will be provisioned for chloride monitoring. In addition, further evaluation of saltwater intrusion based on Well No. 2 construction and testing results will be required.

Potential for Impairment

RCW 90.03.290 requires a determination that a new appropriation will not impair existing rights. Based on the radius of influence calculations presented above, consideration of permits, certificates, and claims within a 1.0-mile radius of the proposed withdrawal was considered conservatively inclusive of all potentially affected senior rights.

There are two existing water right permits and 12 certificates for groundwater within 1.0-mile of the subject application's proposed point(s) of withdrawal. All of the groundwater water rights are for groundwater and are primarily specified for general domestic supply or irrigation. The water rights vary in quantity from 4 to 460 afy and the many are completed in the Sea Level Aquifer. The majority of the water rights belong to Anderson & Sons, supplying Lakeland Village with irrigation and domestic water. Table 1 lists the water rights and describes the water quantities allocated and location of the point of withdrawal.

Priority Date	Water Right Number	Name	Purpose	Qi in gpm	Qa in afy	Point of Diversion/Withdrawal
12/6/1966	G2-*08417CWRIS	Anderson & Sons Inc	DM	40	64	T 22N R1W Section 19 SE/NE
5/16/1973	G2-21045CWRIS	Anderson & Sons Inc	IR,DM	150	180	T 22N R1W Section 17 SW/SE
6/28/1974	G2-23579CWRIS	Matson & Sargent	DM,CI	30	46	T 22N R1W Section 17
7/12/1974	G2-23025CWRIS	Church Of Latter Day Saint	DM	100	1.62	T 22N R1W Section 19 SW/NW
4/30/1975	G2-23808CWRIS	Wynwood Of Gig Harbor/Allyn Shopng Centr	CI	100	16.5	T 22N R1W Section 20
7/30/1975	G2-23913CWRIS	Anderson & Sons Inc	DM	200	280	T 22N R1W Section 20 SE/NW
9/12/1980	G2-25692CWRIS	Anderson & Sons Inc	DM	200	280	T 22N R1W Section 20 SE/NW
5/13/1981	G2-25894CWRIS	Anderson & Sons Inc	IR,DM	400	460	T 22N R1W Section 20 SE/NW
12/11/1984	G2-26628CWRIS	Port of Allyn	DM	65	14	T 22N R1W Section 20
1/24/1985	G2-26646CWRIS	Washington Water Service	DM,CI	100	16.5	T 22N R1W Section 20 NW/SE
3/7/1985	G2-26658CWRIS	Anderson & Sons Inc	IR,DM	130	208	T 22N R1W Section 17 NE/SW
6/20/1985	G2-26731CWRIS	Jack Baty & Associates	DM	40	4	T 22N R1W Section 18 SE/NW
10/2/1992	G2-28625	Anderson & Sons Inc	MU,IR	400	83.9	T 22N R1W Section 20
2/13/1997	G2-29463	Washington Water Service	MU	60	60.5	T 22N R1W Section 20

Table 1. Groundwater Water Right Permits and Certificates within a 1.0-Mile Radius of Proposed Points of Withdrawal.

There are 11 certificated surface (and two reservoir) water rights within a 1.0-mile radius. Impacts to surface water from pumping from the Sea Level Aquifer are assumed to be minimal based on the stream depletion analysis; therefore, impairment to existing surface water rights will not occur.

A total of 61 claims to vested water rights to groundwater and surface water were identified in a 1.0-mile radius.

In addition to certificated, permitted, and claims to water rights, there are a number of exempt wells in a 1.0-mile radius from the proposed points of withdrawal. The Ecology database was queried for well logs within a 1.0-mile radius of the subject application, resulting in 64 possible exempt water supply wells. A review of the well log information for these wells indicated the majority of the wells are completed in the shallow Qva aquifer. Wells completed in the Qva are separated from the Sea Level Aquifer by a thick (50 to over 300 feet) aquitard. This unit greatly reduces the hydraulic connection between the Qva and Sea Level Aquifer. Therefore, impairment of wells completed in the Qva aquifer is not expected to occur.

Existing points of withdrawal completed in the Sea level Aquifer will likely experience some interference from pumping of the Port's proposed Well No. 2. The nearest well known to be completed in the Sea Level Aquifer (Carey; Well ID BAR601) is approximately 800 feet away from the proposed location of Well No. 2. Assuming an average pumping rate of 186 gpm, approximately 20 feet of interference drawdown is calculated to occur at the neighboring well. Assuming a peak pumping rate of 555 gpm for 24 consecutive hours (three times the typical pumping schedule), approximately 16 feet of interference drawdown is calculated to occur.

These calculations assume no constant head boundary representing Case Inlet (North Bay) or leakage from the overlying aquifer and are considered worst case. In addition, they assume the entire volume will be withdrawn from a single point of withdrawal (the subject appropriation will likely be split between two wells). PGG (2005) reported than no discernible drawdown was observed in Lakeland Village Well 2 while testing Well 6 at 400 gpm (approximately 3,000 feet apart). It is also noted that no pumping interference effects from neighboring production wells are discernable in the background groundwater elevation monitoring in the Port's existing Well No. 1, even though up to 5 feet of interference drawdown was predicted (PGG 2005). Therefore, these impacts are likely overstated.

The Carey well is completed to a similar elevation as the Port's Well No. 1 and has over 270 feet of available drawdown. Assuming the entire volume is extracted from Well No. 2 under peak pumping scenarios, the resulting interference drawdown will not result in impairment.

We conclude that although pumping interference effects are likely, no impairment of existing rights is anticipated with full use of the requested quantity.

Public Welfare
No detriment to the public welfare was identified.

CONCLUSIONS

The conclusions based on the above investigation are as follow:

1. The proposed appropriation for municipal use is a beneficial use of water.
2. The quantity of water requested for use in this application is available for appropriation.
3. The proposed appropriation will not impair senior water rights.
4. The proposed appropriation will not be detrimental to the public interest.

RECOMMENDATION

I recommend an approval of application G2-30268 and issuance of a permit to allow appropriation of groundwater from two wells up to a combined maximum instantaneous withdrawal rate of 555 gpm and total annual withdrawal of 300 acre-feet per year for municipal use. The period of use will be year round, as needed.

The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required.

Use of water under this permit is subject to the effectiveness of the proposed mitigation plan and continued agreement with Mason County Utilities and Waste Management to permanently discharge 2.7 acre-feet per month as mitigation on behalf of the Port of Allyn. All new hookups to the Port of Allyn's water system are required to be serviced by the North Bay-Case Inlet Water Reclamation Facility, per Mason County Code.

Monitoring of water levels and chloride concentrations shall continue for the life of the permit and certificate. If detriment to the public interest or to existing wells by saltwater intrusion occurs after issuance of the certificate, the Port of Allyn must mitigate by reducing or altering pumping or by supplying water to affected parties.

Prior to the beneficial use of groundwater from Well No. 2, a well construction and testing report shall be prepared and submitted to Ecology. The report must include an update to the preliminary leakage analysis specific to the location of Well No. 2 and a demonstration of the effectiveness of the proposed mitigation plan.

All wells under this permit must be completed in the Sea Level Aquifer, as defined above.

The permit shall be subject to existing rights and the following provisions:

1. The applicant is advised that the quantity of water allocated by this permit may be reduced at the time of final certification to reflect system capacity and actual usage.

   A certificate of water right will not be issued until a final investigation is made.

2. An approved measuring device shall be installed and maintained for each well used under this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use," Chapter 173-173 WAC.

   WAC 173-173 describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition the Department of Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document titled "Water Measurement Device Installation and Operation Requirements". See http://www.ecy.wa.gov/programs/wr/measuring/measuringhome.html

   Water use data shall be recorded weekly. The maximum monthly rate of withdrawal and the monthly total volume shall be submitted to the Department of Ecology by January 31st of each calendar year. Water use data shall be submitted via the Internet. To set up an Internet reporting account, access: https://fortress.wa.gov/ecy/wrx/wrx/Meteringx/.

   Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the project location, and to inspect at reasonable times, records of water use, points of withdrawal, measuring devices, and associated distribution systems for compliance with water law.

Report Prepared by Tyson D. Carlson, LHG, Aspect Consulting, LLC

REVIEWED BY: Phil Crane Date: 4/28/2010
Phil Crane

FINDINGS OF FACT AND DECISION

Upon reviewing the above report, I find all facts, relevant and material to the subject application, have been thoroughly investigated. Furthermore, I find water is available for appropriation and the appropriation as recommended is a beneficial use and will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER a permit be issued under Ground Water Application Number G2-30268, subject to existing rights and indicated provisions, to allow appropriation of public ground water for the amount and uses specified in the foregoing report.

Signed at Olympia, Washington, this 28th day of April, 2010.

Thomas Loranger
Water Resources Supervisor
Southwest Regional Office

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